

The genus *Ummidia* Thorell 1875 in the western Mediterranean, a review (Araneae: Mygalomorphae: Ctenizidae)

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Abstract. The presence and origin of the mygalomorph spider genus *Ummidia* Thorell 1875 in the western Mediterranean region is reconsidered. The traditional idea, expressed in the works of Walckenaer and Simon, that *Ummidia* is a recent American import in the Mediterranean region, is opposed by the observation that at least four distinct *Ummidia* species inhabit different geographical areas within the western Mediterranean. The taxonomical revision of the Mediterranean *Ummidia* fauna presented here results in the description of one new species (*Ummidia algarve* n. sp.), the removal of *U. picea* Thorell 1875 and *U. algeriana* (Lucas 1846) from synonymy with *U. aedificatoria* (Westwood 1840) and the placing of *U. occidentalis* (Simon 1909) in synonymy with *U. aedificatoria* (Westwood 1840).

Keywords: Taxonomy, synonymy, new species, spider

The trapdoor spider genus *Ummidia* Thorell 1875 is taxonomically grouped with the genus *Conothele* Thorell 1878 in the Ctenizidae subfamily Pachylomerinae (Raven 1985), recently renamed Ummidiinae (Ortiz 2007), which name is here used. The genus *Hebestatis* Simon 1903, traditionally also included in the Ummidiinae (Simon 1903; Raven 1985), is here excluded on grounds discussed below (see discussion). The Ummidiinae, as understood here, are distinguished from other ctenizids on the basis of a pronounced and unique combination of macromorphological characters (see Fig. 1) that include a proximal dorsal glabrous depression or saddle on tibia III, a sharp apophysis on the dorsal-prolateral trochanter III, clavate trichobothria on the proximal dorsal tarsi, curvy short spines on the lateral faces of the distal segments of the palps and anterior legs and a compact eye-group placed on and around a distinct ocular tubercle (A.E. Decae personal observation). Furthermore, spiders of the Ummidiinae show a remarkable sexual dimorphism in the texture of the carapace. In females, the carapace is smooth and shiny as if polished; in males, the carapace surface is dull and typically rugose or granulated (Figs. 2, 3). Finally, females of the Ummidiinae differ from other ctenizid genera by the possession of three-partite spermathecae with a distinctly sclerotized central section connecting the proximal and distal membranous sections (Figs. 16–19). Geographically, the ranges of the genera *Ummidia* and *Conothele* are separated (Fig. 4), although the presence of *U. gandjinoi* Andreeva 1968 in Tajikistan (see also Zonstein 2007) appears to be a bridgehead of *Ummidia* in *Conothele* territory. The genus *Ummidia*, with around 20 described and many undescribed species (Bond & Hendrixson 2005), has a predominantly American distribution and *Conothele*, with 18 recorded species (Platnick 2009) is widely distributed in the Orient and Australasian region. Both genera, contrary to most trapdoor spiders, are not only found in continental regions, but also occur on oceanic and volcanic islands which suggests a relatively strong capacity for dispersal, either natural or man-aided. *Conothele* has been reported from several Pacific Islands (Pocock 1898; Berland 1938; Roewer 1963) and from the Seychelles (Saaristo 2002).

Ummidia is reported from several Caribbean islands, including volcanic St. Vincent (Simon 1891), and from Bermuda (Whitehead unpublished). If this last record is correct *Ummidia* inhabits an Atlantic island over a thousand kilometers off the American east coast. The ability for aerial dispersal in *Ummidia*, originally reported by Bearg (1928) and recently confirmed by Coyle (1985) and Eberhard (2005), might have played a key role in reaching such far out locations. The presence of a geographically isolated *Ummidia* population in the western Mediterranean (extreme NW Africa and southern parts of the Iberian Peninsula) is of special interest in this respect. Is it a product of eastward cross-Atlantic dispersal as Simon believed, is it a relict of a former pan-Eurasian *Ummidial/Conothele* distribution, or does it have an endemic identity of its own? To solve these questions more suitable material for study, more advanced research techniques and more coordinated research efforts will be necessary (e.g., to establish the phylogenetic relations within and between geographically isolated species), but a taxonomical review of the currently available data on the western Mediterranean *Ummidia* fauna, as presented here, is a useful first step.

METHODS

Material.—The material studied consisted of a sample of 36 *Ummidia* specimens (23 female + 13 male). Fourteen females and 11 males were recently collected from southern parts of the Iberian Peninsula, both in Spain and in Portugal. Nine females from North Africa and one male from Spain (Cartagena) were found in Simon's collection at the Museum National d' Histoire Naturelle (MNHN) in Paris and a single male from Spain was found in the collection of the British Museum Natural of History (BMNH), London. Although not explicitly stated on the tube labels, type specimens of *Actinopus (Ummidia) algerianus* (Lucas 1846) and *Pachylomerus (Ummidia) occidentalis* (Simon 1909) were probably among the material studied in Paris. Further relevant information was obtained through the kind cooperation of the Oxford University Museum (OUM), which provided photographs of the dried type specimens of *Actinopus*

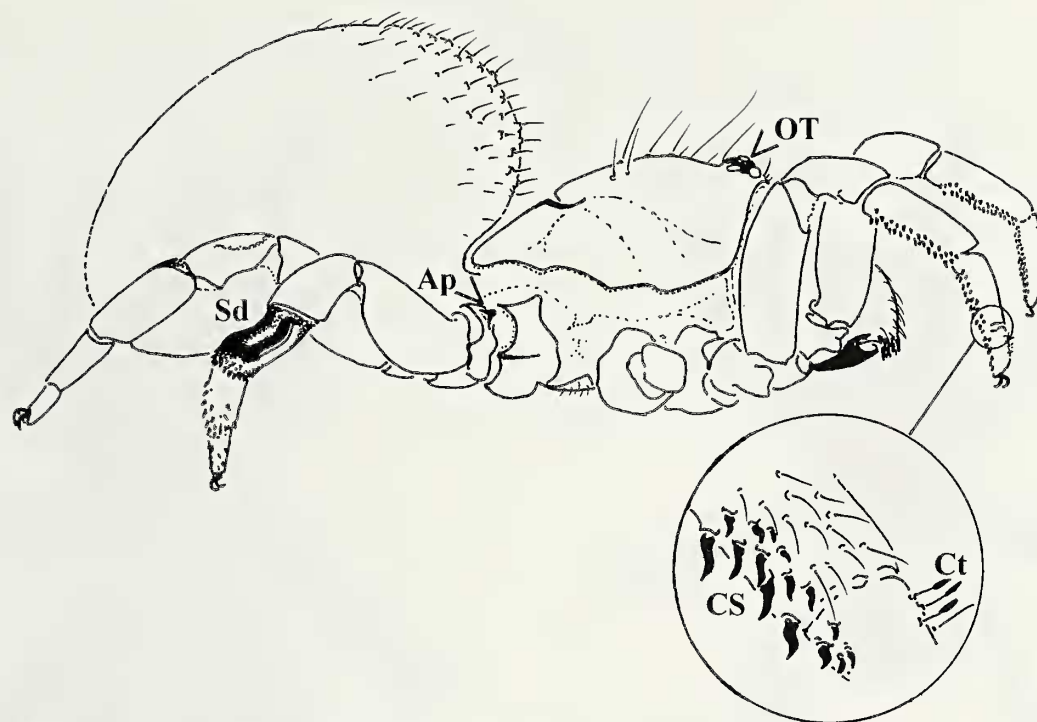


Figure 1.—Right lateral view of a *Ummidia* (female), highlighting diagnostic characters for the subfamily; Sd = saddle depression on dorsal tibia III; Ap = apophysis on dorsal trochanter III; CT = clavate trichobothria; CS = curly spines in dense spine fields; OT = ocular tubercle.

(*Ummidia*) *aedificatoria* (Westwood 1840). Specimens described here as *U. algarve* n. sp. and *U. picea* Thorell 1875 are placed in the collection of the Natural History Museum Rotterdam (NHMR).

Morphological studies were carried out with the aid of several different stereomicroscopes (as available in the above-mentioned institutions), all equipped with camera lucida drawing devices and ocular micrometers. Photographs were taken with an Olympus E-500 reflex camera equipped with a 50mm macro-lens and a ring-flash. Methods of measurement and abbreviations are as given in Figs. 5–9. All linear measures are given in mm.

Abbreviations: BL = total body length, CL = carapace length, CW = carapace width, Cap = caput length, EL = length eye-group, EW = width eye-group, SL = sternum length, SW = sternum width, LL = labium length, LW = labium width, ML = maxillum length, MW = maxillum width, Tar = tarsus, Met = metatarsus, Tib = tibia, Pat = patella, Fem = femur, l = length, w = width.

Length/width ratios of sclerotized body parts (carapace, sternum, labium, maxillae) are given in all descriptions. The length/width ratio of the ocular quadrangle (Fig. 6) is of important diagnostic value. The location of the fovea is indicated by its position relative to the anterior edge of the carapace expressed as Cap/CL (Fig. 5).

TAXONOMY

Genus *Ummidia* Thorell 1875
Ummidia Thorell 1875:102.

Type species.—*Ummidia picea* Thorell 1875:102 by original designation.

Synonymy.—All characters, morphological or behavioral, that have been proposed to distinguish *Ummidia* from *Conothele* (Simon 1892; Roth 1982; Raven 1985; Haupt 2005) have proved to be insubstantial (A.E. Decae personal observation). Therefore Main's (1982, 1998) postulate that *Ummidia* and *Conothele* are synonyms is followed here. The name *Ummidia* is retained on grounds of priority to indicate a nearly cosmopolitan genus with representative species on all inhabitable continents and several oceanic islands.

Species list, Western Mediterranean.—The following four *Ummidia* species are regarded taxonomically valid and indigenous to the Western Mediterranean region: *U. algarve* n.sp.; *U. picea* Thorell 1875; *U. algeriana* (Lucas 1846); *U. aedificatoria* (Westwood 1840). All these species are diagnosed and described below.

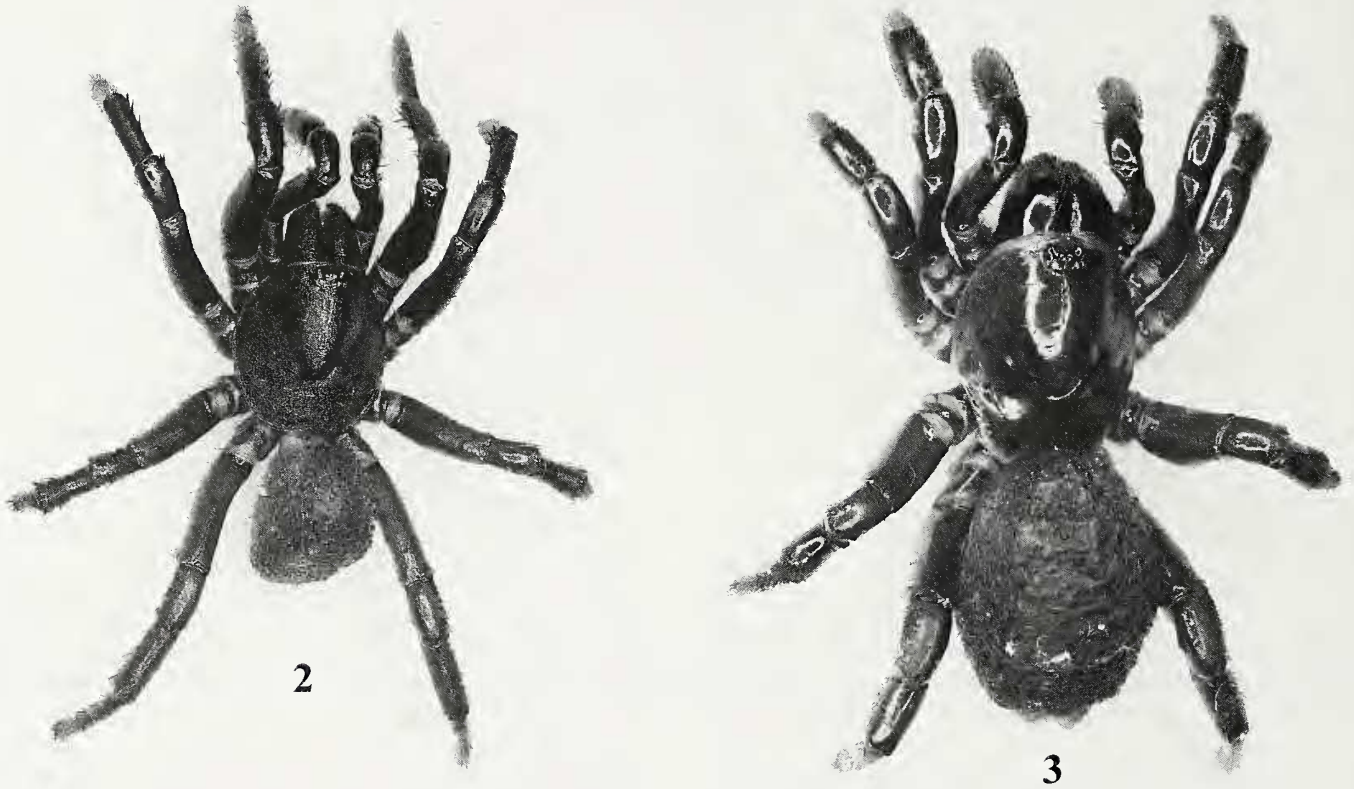
Ummidia algarve new species
Figs. 2, 3, 10, 11, 17, 21, 23.

Pachylomerus aedificatorius: O. Pickard-Cambridge 1907:818–819, pl. L, figs. 1–6. MISIDENTIFICATION.

P. piceus: Frade & Bacelar 1931:510, figs. 3, 4; Bacelar 1937:1568–1571, figs. 1, 2. MISIDENTIFICATION.

Type specimens.—Southern PORTUGAL: 1 ♂ holotype, 22 March 2007 by S. Huber at Quelfes Algarve 37.217°N, 7.839°W, slope along a field road. 1 ♀ paratype, 22 October 2006, S. Huber, east of Alte, Algarve at Pena da Rocha 37.250°N, 8.098°W, southern slope along walking trail.

Other material studied.—1 ♂, 13 August 1996 coll. P. Selden, Praia da Marinha Algarve 37.14°N, 8.45°W; 4 ♂♂, October 2003 coll. P. Cardoso, Ribeira de Limas Mertola Beja Alentejo 37.82°N, 7.62°W; 4 ♂♂, October–November 2003 coll. P. Cardoso, Corredura Beja Alentejo 37.75°N, 07.64°W; 3 ♀♀,



Figures 2, 3.—*Ummidia algarve* n. sp. 2. male, note the dull granulated carapace. 3. female, note the shiny polished carapace.

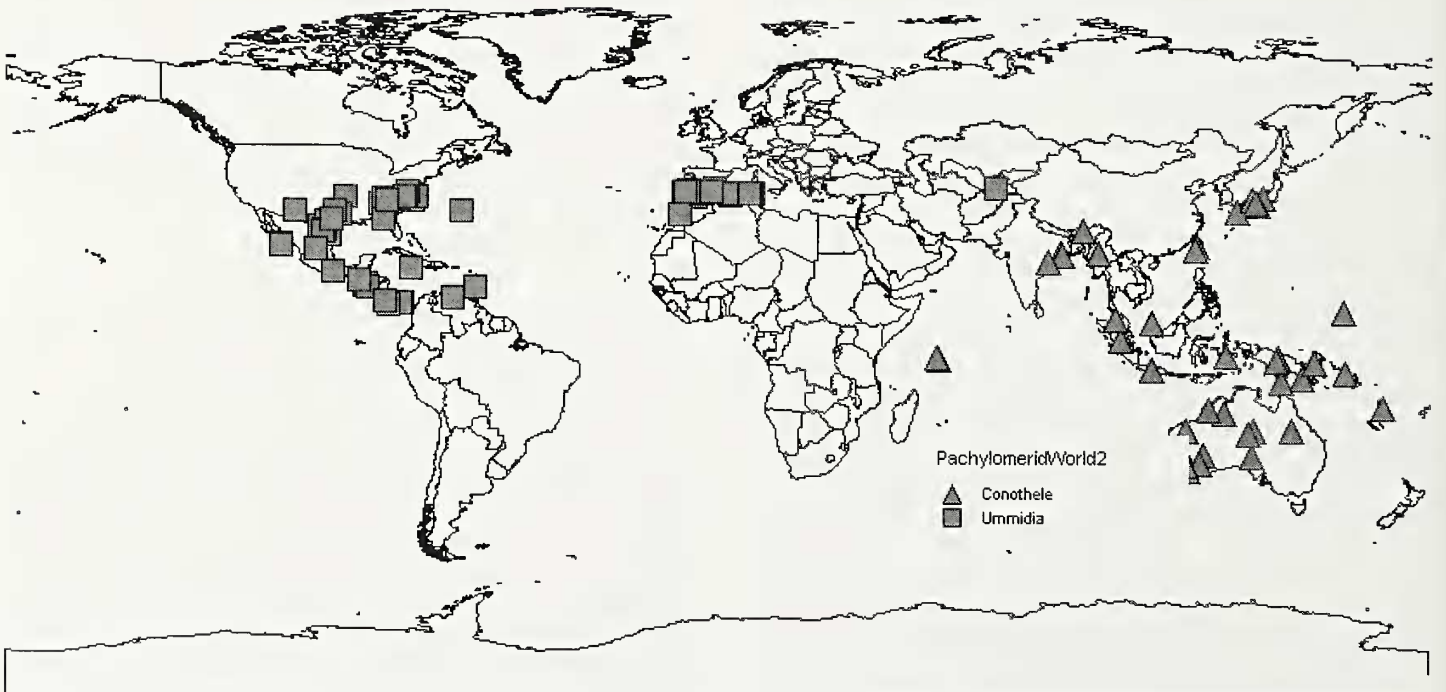
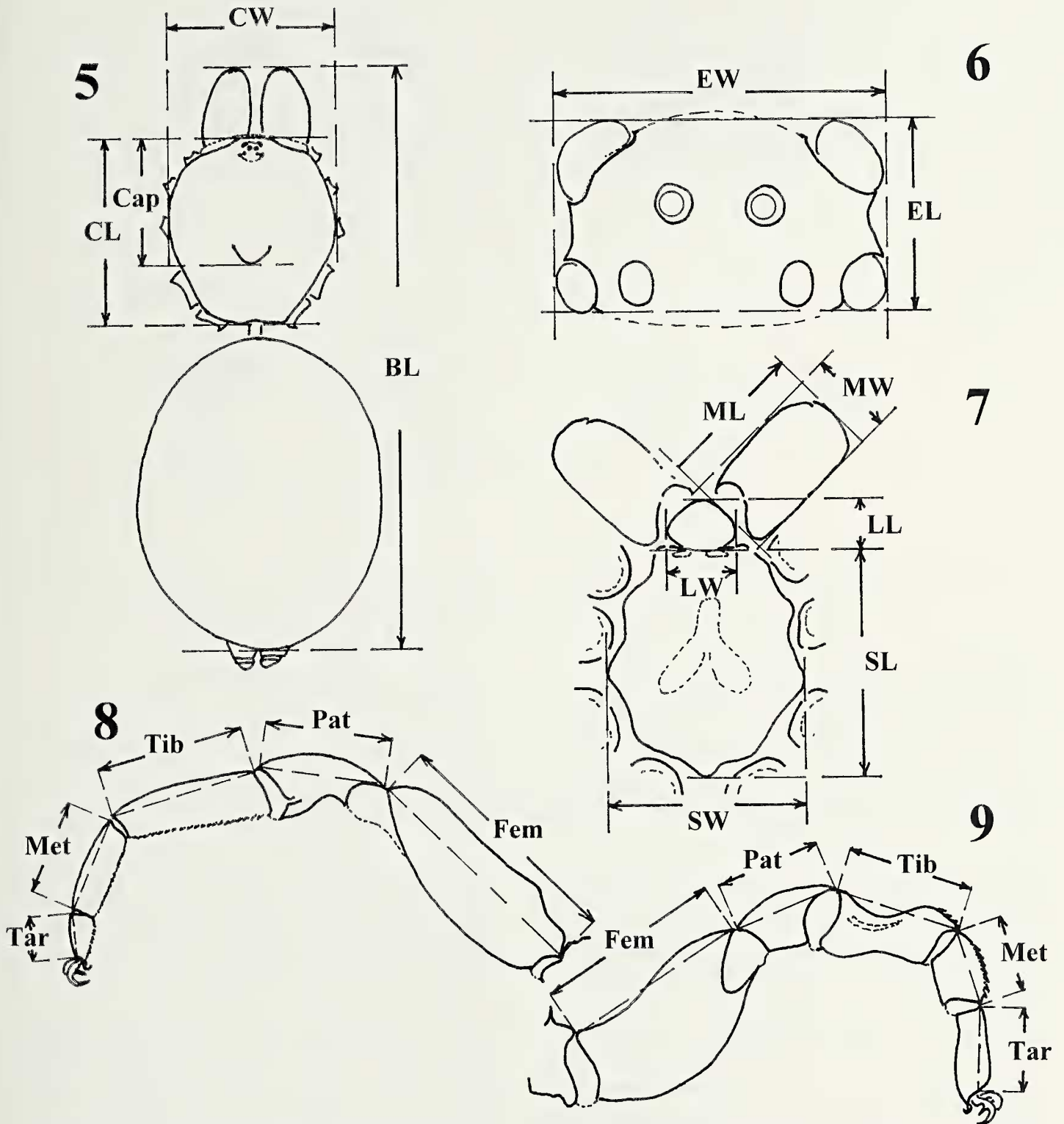
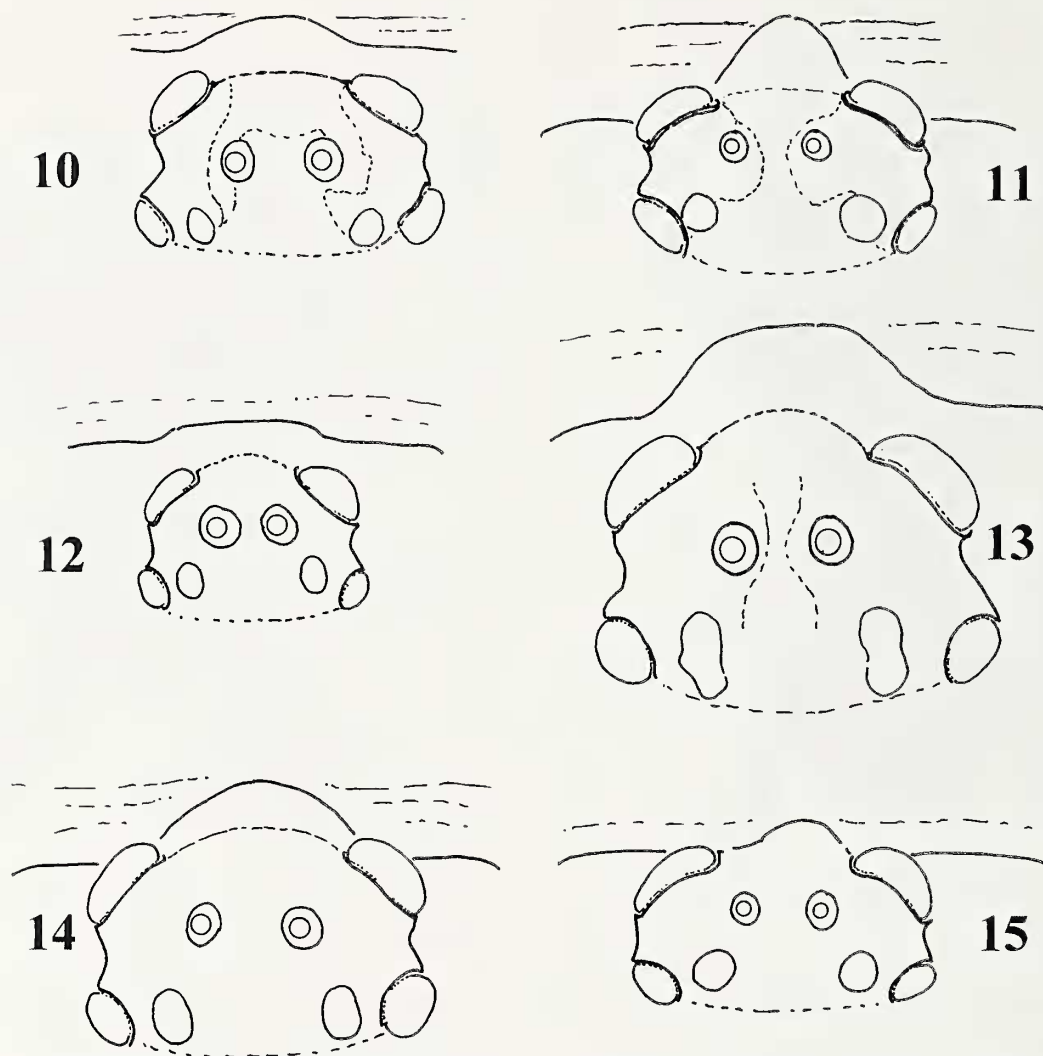


Figure 4.—World distribution of Ummidiinae based on currently available data. Squares = *Ummidia* spp., triangles = *Conothele* spp.



Figures 5-9.—Methods of measurement and abbreviations used. 5. Dorsal body parts: BL = total length of body, CL = carapace length, CW = carapace width, Cap = caput length; 6. Ocular quadrangle: EL = eye group length, EW = eye group width; 7. Ventral body parts: SL = sternum length, SW - sternum width, LL = labium length, LW = labium width, ML = maxillum length, MW = maxillum width; 8. Anterior legs and palps, length only measured along retrolateral face: Tar = tarsus, Met = metatarsus, Tib = tibia, Pat = patella, Fem = femur; 9. Posterior leg length measured along prolateral face abbreviations as in 8.



Figures 10–15.—Eye-formations in dorsal view of western Mediterranean *Ummidia* species. 10. *U. algarve* male holotype; 11. *U. algarve* female paratype; 12. *U. picea* male; 13. *U. picea* female; 14. *U. algeriana* female; 15. *U. aedificatoria* female.

October 2003, coll. P. Cardoso, Ribeira de Limas Mertola, Beja Alentejo 37.82°N, 07.62°W; 2 ♀♀, 22 August 1996, coll. P. Selden, Praia da Oura Algarve 37.08°N, 08.24°W; 1 ♀, 16 August 1996, coll. P. Selden, Belem-Monchique Algarve 37.31°N, 08.59°W; 1 ♀, 15 August 1986, coll. P. Selden, Senhora de Rocha Algarve 37.10°N, 08.37°W.

Etymology.—The species is named after the region and former Moorish kingdom Algarve in South Portugal where it was first discovered (O. Pickard-Cambridge 1907). The geographically inspired name was chosen because it is regarded appropriate for a trapdoor spider species, since these species tend to be local endemics. An earlier suggestion by Amelia Bacelar (1937:1369) to name the Portuguese *Ummidia* species after O. Pickard-Cambridge, who first reported it in scientific literature, is not followed because of potential confusion with *Conothele cambridgei* Thorell 1890 upon future revision of the Ummidiinae.

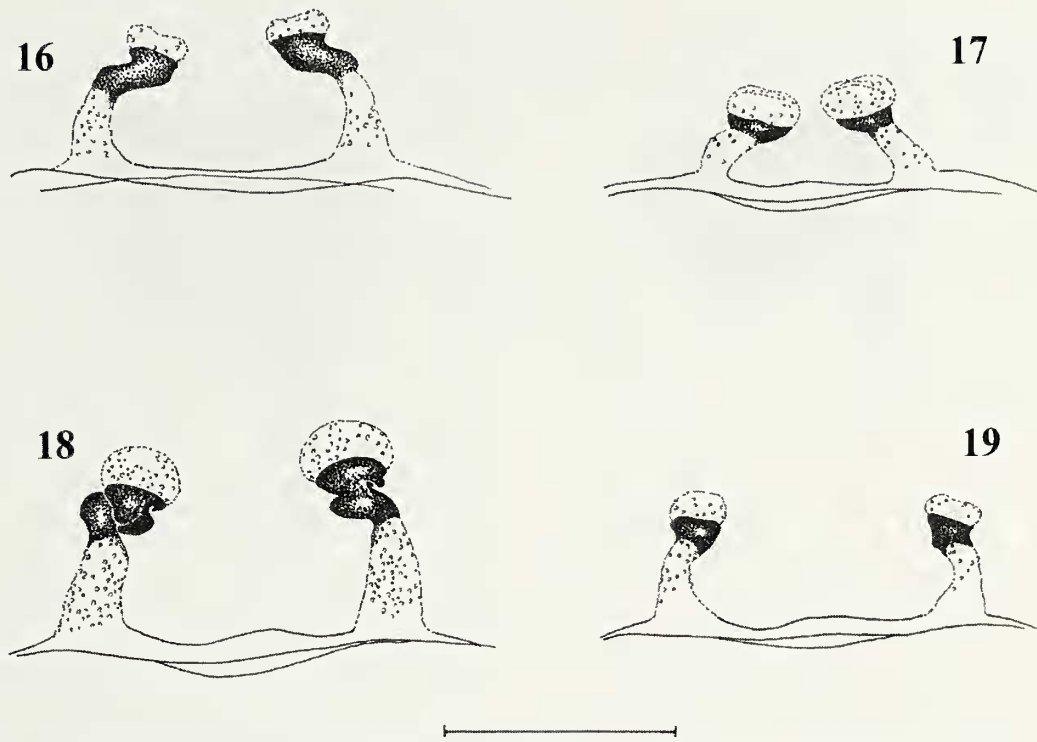
Diagnosis.—Differs from all other western Mediterranean *Ummidia* species by the small straight mushroom shaped spermathecae (Fig. 17) and the warty texture of the abdominal cuticle. Differs from *U. piceus* by the relatively short, strong

and smoothly curved embolus with sub-apical fishhook tooth (Fig. 23) and low ocular quadrangle ratio ($l/w = 0.58$).

Measurements.—*Male holotype*: BL = 14.5; CL = 6.8; CW = 6.7; Cap = 4.8; EL = 3.0; EW = 4.2; SL = 4.2. SW = 3.7; LL = 0.8; LW = 1.3; ML = 2.7; MW = 1.6.

	Tar	Met	Tib	Pat	Fem	Total
Palp	1.4	—	3.3	2.1	4.4	11.2
Leg 1	1.2	2.5	3.3	2.8	5.3	17.6
Leg 2	1.2	2.2	3.2	2.8	4.9	16.4
Leg 3	1.6	2.1	2.6	2.1	4.1	14.6
Leg 4	1.8	3.5	2.3	2.8	5.5	18.6

Description.—*Male holotype* (Fig. 2): Carapace: ($l/w = 1.0$) black with shades of dark red, cephalic area slightly darker than thorax part, few bristles on clypeus and on cephalic area crest, cuticle strongly granulated with thicker rim around edges. Clypeus: narrow. Cephalic area: moderately elevated.



Figures 16–19.—Studies of the spermathecae of western Mediterranean *Ummidia* species in ventral view. Note sclerotized central sections of the spermathecae: 16. *U. picea* (note double-bent central sections); 17. *U. algarve* (note mushroom type and cup-shaped central sections); 18. *U. algeriana* (note twisted central sections); 19. *U. aedificatoria* (note short bent central sections). Scale-line = 1 mm.

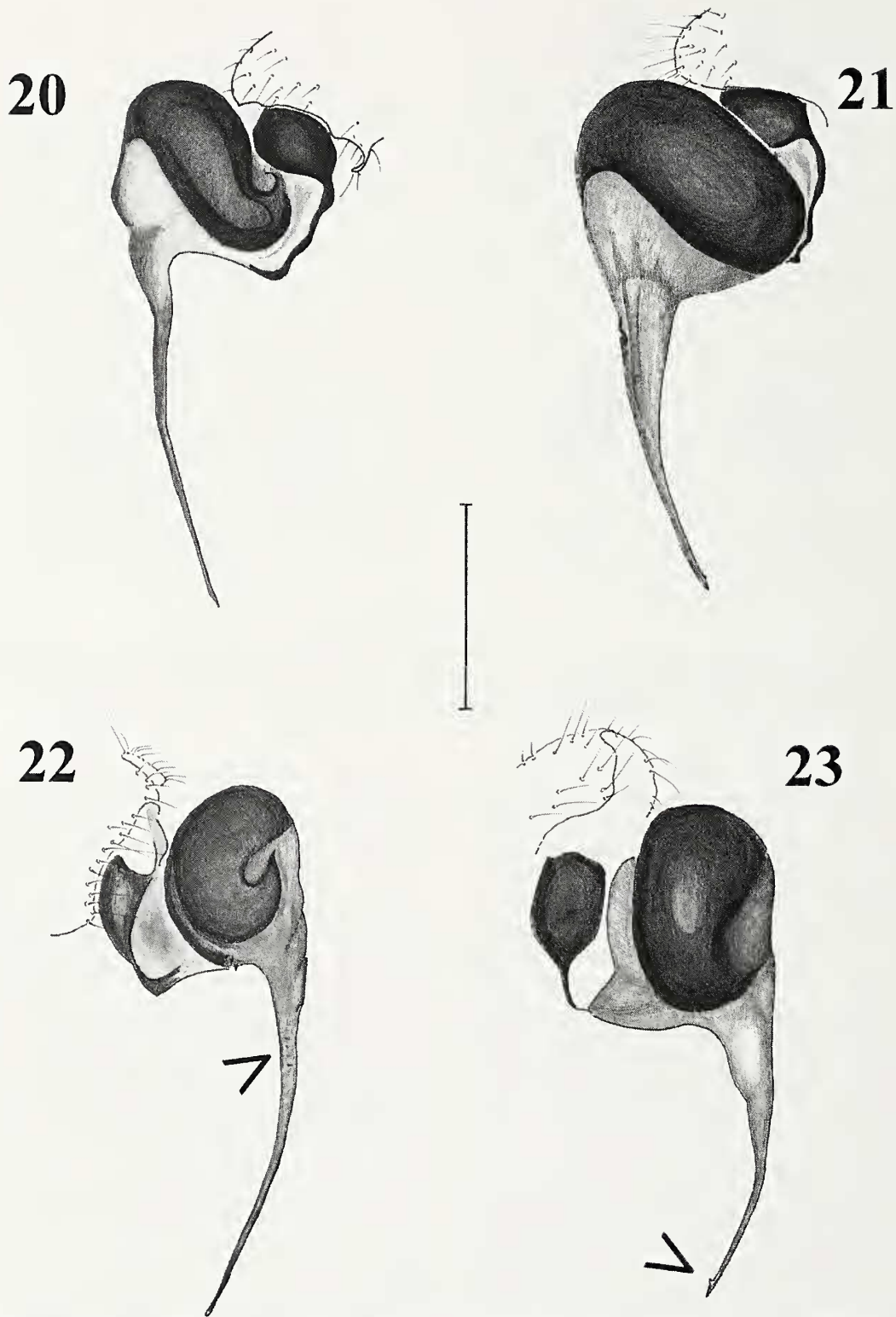
Eye-group: ($l/w = 0.6$) eight eyes compactly grouped in two rows on and around low ocular process, anterior row strongly procurved, posterior row straight (Fig. 10). Fovea: position $Cap/CL = 0.7$, deep, smoothly procurved. Chelicerae: strong, dorsally black, cuticle granulated, few setae mainly in apical zone; ventrally warm orange brown, cheliceral furrow lined with rows of teeth on either side, 5 prolateral, 6 retrolateral. Rastellum: tight group of strong teeth on well developed apical process. Fangs: with distinct serrated ventral ridges. Maxillae: ($l/w = 1.7$) trapezoid, orange brown, cuspules groups strongly reduced both in sizes of cuspules and in numbers. Palp trochanters: without ventral cuspules. Labium: ($l/w = 0.6$) triangular shape, dark grey-brown, cuspules reduced. Sternum: ($l/w = 1.1$) brown, grading to lighter shades posterior, setae concentrated in lateral zones around glabrous central zone. Anterior legs & palps: dark brown, tarsi and metatarsi legs I & II light yellow brown, cuticle proximal segments ribbed and granulate, spines absent from palps and arranged in ventral lateral groups on tibiae, metatarsi and tarsi legs I & II, strong distal spines on ventral patellae I & II, trichobothria present on all metatarsi and tibiae, most strongly developed on all dorsal tarsi in dense disordered groups of both filiform- and clavate-bothria; dense scopula of short hairs on ventral tarsi and metatarsi I & II, paired claws with variable number of strong lateral teeth (sometimes fused into an irregular comb), 3rd claw very small.; trochanter apophysis reduced armed with a strong spine, femur bent and ventrally enlarged (Fig. 9: Fem), with spines distributed on dorsal and prolateral faces, patella short with group of sharp spines along dorsal prolateral side, tibia with shallow saddle and spines along distal edge and, retrolaterally, metatarsus

narrowing distally with strong spines along distal edge, tarsus cylindrical with numerous spines ventrally and distally, paired claws with one large and one small tooth. Leg IV: lighter in color than other legs, femur finely ribbed with few short spines dorsally, patella with elliptical glabrous patch dorsally lined with fine denticles proximally, distally segments unmodified. Abdomen: with strongly developed wart-like sockets for individual bristles as in female. Spinnerets: PMS digitiform, proximally light brown, distally creamy white with numerous small spigots and one apical macro-spigot, PLS three equally short segments all proximally light brown and distally creamy white fields with numerous fine spigots and few macro-spigots. Bulb: (Figs. 21–23) as described in diagnosis.

Measurements.—*Female paratype* (Fig. 3): BL = 14.5; CL = 6.9; CW = 6.2; Cap = 4.8; EL = 2.8; EW = 5.5; SL = 4.5; SW = 3.9; LL = 1.0; LW = 1.6; ML = 2.9; MW = 1.6.

	Tar	Met	Tib	Pat	Fem	Total
Palp	1.9	—	2.0	2.1	3.7	9.7
Leg 1	1.0	1.7	2.4	2.6	4.1	11.7
Leg 2	1.0	1.4	2.0	2.4	3.7	10.6
Leg 3	1.2	1.4	1.7	2.1	3.6	9.9
Leg 4	1.4	2.2	2.5	2.6	4.7	13.5

Description.—*Female paratype*: Carapace: ($l/w = 1.1$) smooth, shining, with bristles only around eye-group, short crest-row with two lateral bristle rows reduced to only one pair of bristles. Clypeus: protracted onto membranous connection between carapace and chelicerae. Cephalic area: smoothly elevated. Eye-group: ($l/w = 0.6$) eight eyes placed in two rows



Figures 20–23.—Studies of the right bulb in Iberian *Ummidia* species. 20. *U. picea* prolateral; 21. *U. algarve* prolateral; 22. *U. picea* retrolateral (arrow indicates denticles); 23. *U. algarve* retrolateral (arrow indicates fish-hook). Scale-line = 1 mm.

near anterior edge of carapace and compactly set around small ocular process, anterior row strongly procurved, posterior row slightly recurved. Fovea: (Cap/CL = 0.7) deep, strongly procurved with distinct light colored anterior tips. Chelicerae: massive, black contrasting with color of carapace, bristles

concentrated along dorsal crests, ventrally orange, cheliceral furrow with 5 prolateral and 7 retrolateral denticles, rastellum of compactly set short teeth on strongly developed process. Fangs: strong, blunt with serrated inner ridge. Maxillae (l/w = 1.8) sub-rectangular, anterior light orange brown with greyish

scopula, cuspules strongly developed, organized in two groups; one with 25 larger cuspules more proximal and anterior and one with 21 smaller cuspules distal and posterior, anterior apical maxillary process indistinct. Palp trochanter: with distinct group of cuspules. Labium: ($l/w = 0.6$) semi-dome shaped, posterior sloping steeply to labial furrow; distinctly bicolored with anterior light crescent carrying an oval-shaped group of 11 strong cuspules. Sternum ($l/w = 1.2$) smooth, with large glabrous central area (fused sigilla) and evenly set setae along lateral zones. Anterior legs & palps: dense lateral fields of short curvy and curved spines on tarsus, metatarsus and tibia (absent from retrolateral tarsus, metatarsus and tibia of leg II), anterior patellae and femora without spines with the exception of one distal prolateral spine on palp patella. Leg III: blunt pointed apophysis on prolateral dorsal trochanter, femur curved and ventrally enlarged (Fig. 9: Fem), patella short strong with prolateral field of short straight spines, tibia with dorsal proximal dark colored, glabrous, saddle flanked on either side by narrow membranous slits, distal field of short curved spines on distal upward curved part of tibia (Fig. 9: Tib), metatarsus short with dorsal field of strong short spines along full length of segment, tarsus short with dense prolateral spine field along full length of segment and retrolateral spine field distally restricted. Leg IV: trochanter and femur unmodified, patella dorsal glabrous patch with prolateral dense fields of fine cuspules, tibia unmodified without prolateral spines, metatarsus unmodified with dorsal and ventral prolateral rows of 2 spines, tarsus unmodified with apical prolateral group of strong short spines. Trichobothria: large groups of filiform trichobothria and small groups of clavate trichobothria dorsal on all tarsi, few filiform trichobothria in disordered row on dorsal metatarsi; two small rows of filiform trichobothria in proximal half of dorsal tibiae. Abdomen: egg-shaped with evenly distributed bristles set in strongly developed wart-like sockets. Spinnerets: as described for male. Spermathecae: (Fig. 17) short, distally converging mushroom-shaped, proximal part tubular, lightly glandular, medial part sclerotized, distal part donut-shaped lightly glandular.

Variation.—Morphological variation in this species is small, the bulb structure and the structure of the spermathecae were found to be constant in all specimens studied. Total body sizes vary between 12.6 mm and 18.2 mm in males ($n = 10$) and between 12.4 mm and 19.6 mm in females ($n = 8$). Carapace shape as judged by the CL/CW ratios quite constant in females (CL/CW 1.2–1.3; $n = 8$) and somewhat more variable in males (CL/CW 1.0–1.2; $n = 10$).

Natural History.—*U. algarve* is reported to be very common and occurring in quite dense populations, often in close association with nemesiid trapdoor spiders (S. Huber pers. comm.). The burrow structure, with a trapdoor at the entrance of the burrow and a second up-side down trapdoor in the bottom of the burrow has attracted much attention in the literature (O. Pickard- Cambridge 1907; Bacelar 1937; Buchli 1962). This type of burrow distinguishes *U. algarve* from all other Mediterranean *Ummidia* species that construct simple trapdoor burrows with no other internal structures than a dense silken lining of the burrow walls. Buchli (1962) reported that the inverted trapdoor at the bottom of the burrow might only be built by female spiders. Although this curious type of

burrow is presently not known from any other *Ummidia* species, a similar type of burrow has recently been reported from *Conothele varvarti* in eastern India (Siliwal et. al. 2009).

Ummidia picea Thorell 1875

Figs. 12, 13, 16, 20, 22

Ummidia picea Thorell 1875a:102.

U. picea: Thorell 1875b:121.

U. piceus: Frade & Bacelar 1931:511, fig. 4bis.

Pachylomerus aedificatorius: Simon 1909:42. Misidentification.

Diagnosis.—Differs from all other western Mediterranean *Ummidia* species by double bent central sclerotized section of the spermathecae (Fig. 16). Differs from *U. algarve* by the long slender curved embolus, proximal sclerite with distal denticles (Fig. 22).

Material studied.—1 ♂ (described) collected as juvenile 6 April 2007, adult 11 September 2008, coll. A.E. Decae, Barranco de Rio Higuero, Frigliana, Andalusia 36.802°N, 03.875°W. 1 ♀ (described) 4–6 April 1989, coll. A.E. Decae, Nerja, Andalusia 36.764°N, 03.865°W. 1 ♂ MNHN Coll Simon (undated) Cartagena, 37.61°N, 01.00°W. 1 ♂ MNHN 18 September 1919 BMNH Cartagena, 37.61°N, 01.00°W. 3 ♀♀ 4–6 April 2007, coll. A.E. Decae, Barranco de Rio Higuero, Frigliana, Andalusia 37.80°N, 03.83°W. 2 ♀♀ 4–6 April 1989, coll. A.E. Decae, Nerja, Andalusia 36.764°N, 03.865°W.

Measurements.—*Male*: BL = 13.3; CL = 5.6; CW = 5.2; Cap = 3.9; EL = 2.7; EW = 4.1; SL = 3.2; SW = 2.7. LL = 1.0; LW = 1.2; ML = 2.1; MW = 1.2.

	Tar	Met	Tib	Pat	Fem	Total
Palp	1.2	–	2.8	1.7	3.9	9.6
Leg 1	1.2	2.3	2.9	2.3	4.7	13.5
Leg 2	1.2	2.2	2.5	2.2	4.2	12.4
Leg 3	1.4	2.2	2.1	1.9	3.5	11.0
Leg 4	1.7	3.0	2.7	2.0	4.5	13.8

Description.—*Male*: Carapace: ($l/w = 1.1$) glabrous, surface finely striated and granulated. Clypeus: width as longest diameter of ALE, with two brownish lines running from the base of ALE to clypeus edge, setae fully absent. Cephalic area: elevated, laterally not delineated from thorax part of carapace. Fovea: (Cap/CL = 0.7) regularly procurved. Eye-group: ($l/w = 0.6$) on dome-shaped process, anterior row strongly procurved, posterior row straight, ALEs largest, PME's teardrop shaped. Chelicerae: basal segment striated and granulated as earpace, black dorsally grading into warm brown ventrally, distal sharp bristles evenly spaced around very short strong teeth of the rastellum. Rastellar process ventrally pronounced, fangs brown, long, sharp and slightly translucent, with ventral retrolateral serrated ridge. Cheliceral furrow warm brown, bordered with rows of teeth 5 prolateral, 6 retrolateral. Maxillae: ($l/w = 1.8$) sub-rectangular, dark brown, proximally lighter, with distinct light colored anterior edges and silvery white scopulae, cuspules reduced and irregularly spread along ventral surface, proximally more concentrated, distally absent. Labium: ($l/w = 0.8$) relatively

long striated, with contrasting color zones, proximal dark brown, distal light brown, small group of distal cuspules. Sternum: ($l/w = 1.2$) greyish brown, lateral zones lighter than central zone, centrally fused sigilla, widely spaced sharp bristles predominantly in finely striated lateral zones. Palps: long and slender; femur is longest segment; tegument structure, color and setae as described for legs; spines absent from all segments. Legs: dorsally black striated, ventrally greyish, tarsi and metatarsi I & II ventrally light colored and scopulate. Leg III: trochanter with small dorsal apophysis, femur slightly thickened with group of 4 short strong apical spines dorsally, patella with short curved spines along dorsal prolateral face, tibia with transverse striated saddle and few sharp spines irregularly placed, metatarsus with numerous irregularly placed sharp spines, tarsus with numerous ventral spines. Leg IV: trochanter unmodified, femur with few apical dorsal short spines, patella with longitudinal dorsal glabrous zone flanked on either side by short spiny bristles, tibia with ventral longitudinal row of sharp spines, metatarsus and tarsus with numerous sharp ventral spines, dorsal patella IV with central brown zone. Filiform trichobothria on all dorsal tibiae, metatarsi and tarsi. Clavate trichobothria in small groups on proximal dorsal surfaces of all tarsi. Abdomen: evenly covered with fine, spiky bristles, dorsally purplish brown with irregular creamy blotches, ventrally yellowish brown, integument not warty. Spinnerets: PMS short, light colored with few apical spigots, PLS three-segmented with groups of spigots on ventral distal parts of proximal and medial segment and dense apical spigot field on domed distal segment. Bulb (Figs. 20, 22).

Measurements.—*Female*: BL = 26.0; CL = 9.5; CW = 8.5; Cap = 6.8; EL = 4.8; EW = 7.0; SL = 6.5; SW = 5.4; LL = 1.2; LW = 1.9; ML = 3.5; MW = 2.1.

	Tar	Met	Tib	Pat	Fem	Total
Palp	2.9	—	3.7	3.3	5.0	14.9
Leg 1	1.2	2.4	3.5	3.8	5.6	16.5
Leg 2	0.7	2.4	3.3	3.4	5.5	15.3
Leg 3	1.7	1.7	2.7	2.6	4.5	13.1
Leg 4	2.1	3.4	3.1	3.2	6.1	17.8

Description.—*Female*: Carapace: ($l/w = 1.1$) smooth, shining and shaded brown, darkest zones around fovea and above coxa III; crest-line narrow, dark contrasting with lighter crest-zone; crest-bristles strongly developed in straight line and only in anterior half of crest-zone, few finer bristles lateral of crest-zone; no setae along carapace edge. Clypeus: mottled brown, with small group of setae on protracted semi-circular process anterior of eye-formation. Cephalic area: smoothly elevated. Eye-group: ($l/w = 0.6$) on distinct ocular process, anterior row strongly procurved, posterior row straight; ALE largest, AME slightly wider than their diameter apart, PME pearly and caudally protracted projecting caudally beyond PLE. PLE distinctly smaller than AME; groups of strong setae both anterior and posterior of AME on ocular process. Fovea: (Cap/CL = 0.7) deep, strongly and smoothly procurved. Chelicerae: basal segment strong, dark brown distally grading

to black and contrasting in color with carapace, dorsally slightly lighter in color than laterally, ventrally bright orange brown in and along the cheliceral furrow, glabrous between three distinct longitudinal zones with bristles. Cuticle dorsally smooth, distally (in rastellar zone) striated; furrow lined with two irregular rows of 7 or 8 strong stubby teeth, no denticles on furrow bottom, rastellum dense group short strong teeth on distinct process. Fangs: strong, short, and blunt. Fang ridge: smooth. Maxillae: ($l/w = 1.7$) cuspules spiky spread in two size classes over ventral surface, about 35 larger cuspules anterior, about 33 small more posterior. Palp trochanters: with short cusp-like setae. Labium: ($l/w = 0.6$) somewhat diamond shaped, 10 strong distal cuspules in distal half. Labial furrow: glabrous, shallow, with two distinct elliptical sigilla. Sternum: ($l/w = 1.2$) light brown with dark edge, setae mainly in peripheral zone, sigilla fused in central glabrous field. Legs: dorsally dark brown, ventrally lighter, ventral femora III & IV light yellowish brown, anterior coxae darker than posterior coxae; (spine patterns) dense fields short curvy and curved spines on lateral tibiae metatarsi and tarsi I & II, short straight spines on all patellae and on tibiae, Ometatarsi and tarsi III & IV, no spines on femora; patella III with transverse row of short strong spines along the distal edge, tibia III, with dense transverse group of short strong spines along full dorsal width distal of black saddle depression, metatarsus III with group of short strong spines along full dorsal length of segment (apical spines strongest), tarsus III with few prolateral spines and dense spine groups ventrally around apical claw implant; leg IV with dense 'rasp-like' field of very small short spines on dorsal patella and only few fine spines in distal halves of tibia, metatarsus and tarsus; trochanter III with anterior dorsal apophysis. Tarsi with proximal groups of clavate trichobothria (reduced or absent in posterior legs), surrounded by irregularly placed filiform trichobothria; metatarsi with central dorsal longitudinal row of very fine filiform trichobothria (absent from leg I), tibiae with two distally converging rows of very fine filiform trichobothria in proximal quarter; leg scopulae absent; paired claws with one long proximal tooth & one much smaller more distal tooth, 3rd claw vestigial. Abdomen: evenly covered with fine setae, mottled purplish grey with irregular light colored blotches, ventrally overall lighter color. Spinnerets: PMS: digitiform, with distinct lighter colored apical spinneret field with few micro-spigots and one macro-spigot, PLS all three segments short and distally light colored, proximal and medial segment with transverse distal rows of macro-spigots, distal segment with apical spigot field with exclusively micro-spigots. Spermathecae: see diagnosis.

Variation.—The emboli of the 2 male spiders found, one in the BMNH, London, and one in MNHN, Paris, were not as elongated as the embolus in the specimen here described and figured. This could well be the result of handling damage over a long period of time. The material available, however, was insufficient to test this hypothesis, and the possibility that the Spanish *Ummidia* population is more diverse at the species level than presently conceived cannot be ruled out.

Remarks.—Thorell's original description of the male of *U. picea* is very short and inadequate (Thorell 1875:102); the female described as *U. picea* by Frade & Bacelar 1931 actually was a specimen of *U. algarve*. Therefore, both sexes are fully described here.

Natural History.—*U. picea* was found to inhabit steep banks along trails, creeks and canyons in Andalusia, particularly in shady locations. Different from *U. algarve* (see above), *U. picea* does not form aggregations of nests. Single burrows were found throughout the area. Specimens were collected from a number of burrows for further study of morphology (taxonomy) and behavior in the laboratory. The trapdoors were typically, as reported for several *Ummidia* species, placed sideways or even upside down with respect to the slope. A remarkable difference in behavior between *U. picea* and *U. algarve* is the immediate strong holding down of the trapdoor in the first species upon disturbance, and the absence of this behavior in the second species. *U. picea* burrows may be found close to burrows of both nemesiid *Nemesia* and *Cyrtachenus* trapdoor spiders.

Ummidia algeriana (Lucas 1846) comb. nov.
Figs. 14, 18

Actinopus algerianus Lucas 1846:96–97, pl. 1, fig. 5.

Cteniza algeriana: Ausserer 1871:155.

Pachylomerus aedificatorius: Simon 1892, fig. 86; 1903:887, fig. 1048; 1909:42–43.

P. aedificatorius: Frade & Bacelar 1931:509 figs. 1, 2.

MISIDENTIFICATIONS.

Remarks.—Lucas' (1846:96–97) description and figures are very accurate and complete, here only further observations on the morphology of the spermathecae and measurements are given. The measurements are taken from a specimen in Lucas' type series, the spermathecae are drawn after one of the larger specimens in Simon's collection.

Material studied.—9 ♀♀ including a probable type specimen collected by Lucas and found in Simon's collection at the MNHN, Paris.

Diagnosis.—Differs from all other Mediterranean *Ummidia* species in the possession of a twisted central sclerotized section in the spermathecae (Fig. 18). Differs from *U. aedificatoria* in the higher l/w-ratio of the ocular quadrangle (Figs. 14–15), the strong development of the rastellar process, the deep labial furrow with distinct elliptical sigilla and the texture of the abdominal cuticle.

Measurements.—*Female*: BL = 24.4; CL = 8.6; CW = 7.9; Cap = 5.0; EL = 3.7; EW = 6.1; SL = 5.5; SW = 5.0; LL = 1.0; LW = 1.7; ML = 2.7; MW = 1.4.

	Tar	Met	Tib	Pat	Fem	Total
Palp	2.4	—	2.9	2.8	4.8	12.9
Leg 1	1.1	2.3	2.9	3.5	5.2	15.0
Leg 2	1.3	2.2	2.4	3.2	4.6	13.7
Leg 3	1.4	1.9	2.6	2.4	4.3	12.7
Leg 4	1.7	3.0	3.1	3.2	5.7	16.8

Variation.—Total sizes (BL) in the sample of 9 ♀♀ varied between 29.1mm and 17.0mm. Variation in the shape of the carapace (CL/CW = 1.1–1.2; $n=9$), the position of the fovea (CL/Cap = 1.4–1.5; $n=9$) appeared to be very low. Differences found in the length/width ratio of the ocular quadrangle (l/w = 0.6–0.8; $n=9$) suggest some local geographical variability or cryptic diversity.

Natural History.—Simon (1888) reported this species to be widespread in the Tell region of Algeria and western Tunisia, where its burrows were all dug in steep to vertical surfaces along roads and rivers. The burrows were reported to be shallow (6–10 cm), internally lined with dense white silk and closed at the entrance by a stiff thin trapdoor.

Ummidia aedificatoria (Westwood 1840)
Figs. 15, 19

Actinopus aedificatorius Westwood 1840:175, pl. 10.

Sphodros aedificatorius: Walckenaer 1842:438.

Cteniza aedificatoria: Ausserer 1871:155.

Pachylomerus occidentalis Simon 1909:8 New synonym.

Pachylomerus occidentalis: Frade & Bacelar 1931:512, figs. 5, 6.

Remark.—The type of *U. aedificatoria* is a dried specimen in the Oxford University Museum collection, of which photographs by Ray Gabriel were seen, but diagnostic details of the sexual organs could not be studied. Westwood's original description fortunately is very detailed and extensive and is furthermore accompanied by a good set of illustrations (Westwood 1840: Plate 10). Two characters of supposedly diagnostic value — the relatively short ocular quadrangle and the reduced rastellar process— are sufficiently clear in the dried specimen and the illustrations to synonymize Westwood's type of *U. aedificatoria* with Simon's type of *U. occidentalis* that originated from roughly the same type location (Tangiers province in northwestern Morocco; Fig. 24). Because Simon's spider at the MNHN Paris is the only specimen available for closer study, the limited additional diagnostic and descriptive information given here is based on that specimen.

Material studied.—2 ♀♀ on photographs in the Westwood collection, preserved in dry condition in the Oxford University Museum. 1 ♀ found in Simon's collection at the MNHN, Paris, probable type specimen of *U. occidentalis* that is here synonymized with *U. aedificatoria*.

Diagnosis.—Differs from all other Mediterranean *Ummidia* species by the short bent central section of the spermathecae (Fig. 19), the low length/width ratio of the ocular quadrangle (Fig. 15) and the reduced rastellar process.

Measurements.—*Female*: BL = 18.1; CL = 8.2; CW = 6.7; Cap = 5.8; EL = 0.4; EW = 0.8.

Variation.—Only three female specimens are currently known, two of which have been preserved in dried condition for almost 170 years. Nevertheless, it is clear that *U. aedificatoria* falls in the same size range as the other western Mediterranean *Ummidia* species. Total body lengths of adult females in the small sample range from 18.1 to 29.0mm.

Natural History.—Neither Westwood (1840) nor Simon (1909) provides any information about the natural conditions in which *U. aedificatoria* is found. Westwood, however, received the spiders he described alive in their natural burrows. From Westwood's descriptions and figures, and also from photographs of the preserved burrow material in the Oxford University Museum, it might be concluded that *U. aedificatoria* builds the typical shallow silk-lined trapdoor burrow that is very similar to the burrows of *U. algeriana* and *U. picea*.

DISCUSSION

Simon (1903:887–888) included three genera (*Ummidia*, *Conothele* and *Hebestatis*) in his Pachylomereae based on the



Figure 24.—Currently known distribution of the genus *Ummidia* in the western Mediterranean Region based on specimens seen in this study: black circle = *U. aedificatoria*, grey square = *U. algarve*, grey triangle = *U. algeriana*, grey circle = *U. picea*.

shared absence of lateral sternal sigilla. Raven (1985) followed this classification but used the eye tubercle and saddle tibia. However, the probable type specimen in Simon's collection (AR12317 MNHN examined) labelled *Hebestatis theveneti* actually possesses lateral sternal sigilla and furthermore shows sufficient morphological differences from both *Ummidia* and *Conothele* (dorsal saddle on tibia III not pronounced and not glabrous, absence of curvy spines, absence of tarsal clavate trichobothria, absence of centrally sclerotized spermathecae) to exclude the genus *Hebestatis* from the Ummidiinae.

The taxonomy of the genus *Ummidia* in the western Mediterranean has been disputed from the start. Shortly after Westwood (1840) had presented the discovery and description of his *Actinopus aedificatorius* (now *Ummidia aedificatoria*) from Morocco to the Entomological Society of London, Walckenaer (1842) explicitly expressed his doubts about these findings. Walckenaer suspected that Westwood was mistaken in either the origin or the identity of the species described (see also Westwood 1840:181). Westwood had obtained the specimens he presented and described from Mr. Drummond Hay, H.M.'s agent and Consul-general at Tangiers in the far northwest of Morocco. Furthermore, he classified this newly discovered species as belonging "to the same genus as Mr. Sell's Jamaica species, to which it is so closely allied as scarcely to present any specific distinction beyond that of size" (Westwood 1840:174–175). Mr. Sell's Jamaican species is now known as *Ummidia nidulans* (Fabricius 1787) and the fact that Westwood regarded his Moroccan species so closely allied with a Caribbean species caused much skepticism among the

leading arachnologists at that time. The discovery of several other *Ummidia* species in the Americas in the 19th century (e.g., Ausserer 1871:146–147) reinforced the idea that *Ummidia* was naturally restricted in its distribution to the New World and that the incidental finding of *Ummidia* east of the Atlantic must be the result of human-mediated introduction. This idea was most vividly expressed in the work of Simon: "le genre *Pachylomerus*, qui est assez nombreux, est américain, il a cependant un représentant au Japon (d'après Dönitz)" et un autre dans la région méditerranéenne occidentale (Algérie et Espagne), mais ce dernier paraît y avoir été introduit en même temps que les *Opuntia* et les *Agave* d'origine américaine" (Simon 1892:86).

In short, Simon regarded *Pachylomerus* (*Ummidia*) in the western Mediterranean as an American species that was probably introduced with imports of ornamental plants. Central in Simon's opinion was his conviction that only one *Ummidia* species (*U. aedificatoria* Westwood 1840), inhabits the western Mediterranean. In forming his opinion about *Ummidia* in the western Mediterranean, Simon had apparently overlooked the work of Lucas who had described a second *Ummidia* species in North Africa, this time from eastern Algeria. Lucas (1846:96–97) had collected this new species near the town of Bône (now Annabah) over 1200 km east of the locality from where Westwood had obtained *U. aedificatoria*. Lucas furthermore was well aware of the diagnostic differences between his new species, which he described as *Actinopus algerianus* (now *Ummidia algeriana*) and Westwood's *U. aedificatoria*. He distinguished the two species on

the grounds of differences in the morphology of the rastellum, the curved anterior edge of the sternum, the different texture of the abdominal cuticle and the leg-formula (Lucas 1846). Lucas does not mention any differences in the configuration of the eyes (the most commonly used diagnostic feature in classical species-level *Ummidia* taxonomy), but in the excellent figures that both Lucas (1846:pl. 1–5) and Westwood (1840:pl. 10) produced of their type specimens, a difference in the configuration of the eyes between *U. aedificatoria* Westwood and *U. algeriana* Lucas is obvious.

It is therefore unclear why Simon, who collected *Ummidia* in Algeria, never mentioned the differences that Lucas had found between *U. algeriana* and *U. aedificatoria*. Probably as the result of a preconceived conviction that *Ummidia* must be a recent American import in the western Mediterranean Simon, until 1909, regarded all Old World reports of *Ummidia* as reports of *U. aedificatoria* (Westwood 1840). It was Simon (1889) who declared Thorell's *U. picea* from Spain to be the male of *U. aedificatoria* and who convinced O. Pickard-Cambridge (although not wholeheartedly, see Cambridge 1907:818 and Frade & Bacelar 1931:507) that his newly found *Ummidia* species from Portugal also was *U. aedificatoria*. When Simon (1909) worked on the spiders collected by Martínez de la Escalera in Morocco he encountered a species of *Ummidia* that clearly differed from the Algerian *Ummidia* species that he knew so well. That this new species was collected near Tangiers, roughly the type location of *U. aedificatoria*, did not spark his realization that, for the first time, he might actually see Westwood's species under the microscope, so he proceeded to describe a new species *Pachylomerus (Ummidia) occidentalis* (Simon 1909). Simon's description of *U. occidentalis* is brief and without illustrations and he states that the new species is "sub similar —cui subsimilis est" — to *U. aedificatoria*, from which it only differs in the shape of the eye-formation, the spine pattern on the tibia of the palp and the number of spines on the prolateral face of tibia IV. Simon concludes his description of *U. occidentalis* with the somewhat casual and vague remark: "remplace probablement le *P. aedificatorius* au Maroc" (Simon 1909:8). The discovery of a second *Ummidia* species in North Africa apparently did not change Simon's opinion about the origin of the Mediterranean *Ummidia* species, and a year after his description of *U. occidentalis* Simon notes: "le genre *Pachylomerus*" (read *Ummidia*) "dont tous les autres représentants sont américains." (Simon 1910:266).

Frade & Bacelar (1931) in their revision of the Mediterranean *Ummidia* species found that the spine patterns Simon used were strongly variable in *Ummidia* at the species level and even in individual specimens, rendering them unfit for use in species level taxonomy. Furthermore, Frade and Bacelar (1931) found that at least three different *Ummidia* species inhabit the Mediterranean, indicating that Simon had underestimated the species diversity in the region. Nevertheless, Simon's arachnological influence has proved to be far reaching and today, a hundred years after his slip of not recognizing *U. aedificatoria* in the Moroccan spider material he examined, Simon's classification of western Mediterranean *Ummidia* species is still reflected in the World Spider Catalog (Platnick 2009).

The species descriptions given above, however, show that at least four different *Ummidia* species inhabit the western

Mediterranean. Moreover, these species each appear to inhabit distinct geographical regions. *U. algarve* is common in southern Portugal and probably extends into southwestern Spain where the great delta (las marismas) and the alluvial plains of the Guadalquivir may separate it from *U. picea*. *U. picea* is widespread in southern Spain between Valencia and Malaga and probably beyond, towards Gibraltar. *U. aedificatoria* has until now only been reported from Tangiers in the far northwest of Morocco. *U. algeriana* is widespread in the Algerian Tell region, as Simon (1888) reported, from Bougie (Bejaia) in the west to Kroumirie (Ain Drahan) in the east and probably even further east into Tunisia. There are some indications (variation in configuration of the eyes, spermathecae morphology and some other morphological traits) that further geographically-related cryptic diversity is present in the Mediterranean *Ummidia* populations, but the still very limited availability of well documented and usefully preserved material for study currently prevents further conclusions. The idea that *Ummidia* is a recent and probably human-aided introduction in the western Mediterranean appears to be unlikely on grounds of the here-presented observations. The question of whether the Mediterranean *Ummidia* species complex is more closely related to the American *Ummidia* fauna or to the *Ummidia (Conothele)* fauna of Australasia remains to be investigated.

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